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1972

Walter Jackson Freeman II (1895–1972) died in 1972. He was born and raised in Philadelphia, went to Yale and Pennsylvania Medical School. He opened a neurological practice in Washington in 1924, but soon became head of the neurology department at George Washington University. With the assistance of James Watts (1904–1994), Freeman performed numerous prefrontal lobotomies. He followed the technique of gaining access to the brain through the patient's eye socket, based on the work of his mentor, Egas Moniz (1874–1955), and of Italian physician Amarro Fiamberti (1894–1977). As a result, he eventually lost his license to practice surgery.

Georg von Békésy (1899–1972) was born in Budapest, Hungary. Being a biophysicist, he investigated the structure and functioning of the cochlea. In 1947, he moved to the United States, working at Harvard University until 1966. By using strobe photography and silver flakes as a marker, he observed that the basilar membrane moves like a surface wave when stimulated by sound. He concluded that different frequencies of sound cause the maximum amplitudes of the waves at different places on the basilar membrane along the coil of the cochlea. For this research, he was awarded the Nobel Prize in Physiology or Medicine and the ASA Gold Medal from the Acoustical Society of America in 1961.

A cochlear implant, a neurological prosthetic that allows deaf people to hear, was first implanted in 1972. In 1961, William House (1923–2012), an otologist from Los Angeles, developed an electrode that was placed through the round window in two patients. They reported auditory percepts, also noticing the change of loudness when the level of stimulation varied and the change of the pitch with the variation in the rate of stimulation. It took House 10 years to develop a clinically useful device.

In 1972, the first clinical test of computer-assisted tomography scanning (CAT) was performed successfully. Sir Godfrey Newbold Hounsfield (1919–2004), an English electrical engineer born in Newark, Nottinghamshire, was essential in the development of CAT. He was awarded the 1979 Nobel Prize for Physiology or Medicine and was knighted in 1981. His name will be remembered in the eponym "the Hounsfield scale," which is a quantitative measure of radiodensity used in evaluating CT scans.

British neurologist Edwin Clarke (1919–1996) and psychiatrist Kenneth Dewhurst, (1919–1984), both also distinguished historians, published *An Illustrated History of Brain Function* in 1972. The book presented a comprehensive overview of ideas and images of localization of function through the ages and, concomitantly, the development of brain maps over the years.

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Owsei Temkin (1902–2002) published his magnum opus, *The Falling Sickness* in 1972. The book detailed the history of the investigations on epilepsy. He was born in Belarus, moved to the United States in 1932, and became director of the Institute of the History of Medicine at Johns Hopkins in 1958.

1922

Edward Anthony Spitzka (1876–1922)—the son of Edward Charles Spitzka (1852–1914), eminent neurologist, anatomist, and alienist—was an American anatomist and the author of 40 papers on brain anatomy and editor of several editions of the American edition of *Gray's Anatomy*. Widely recognized as one of the world's leading brain anatomists, he directed the Baugh Institute of Anatomy until 1914. He performed postmortem examinations of the brains of many distinguished American men.

Hermann Gutzmann, Sr. (1865–1922), was a German physician and founder of phoniatry. His father was a teacher at the Institute for Deaf and Dumb in Berlin. His dissertation was titled, *On Stuttering* (1883). In 1891, he began a private practice for speech disorders and founded a sanatorium for speech disorders in Berlin. In 1912, he became a professor at the Charité in Berlin.

William Halse Rivers (1864–1922) was an English anthropologist, neurologist, ethnologist, and psychiatrist, best known for his work on treating World War I officers who were suffering from shell shock. He collaborated with Henry Head in demonstrating the varied and evolving patterns of sensory loss after sectioning the superficial ramus of Head's left radial nerve. He was the first to use a type of double-blind procedure in investigating the physical and psychological effects of consumption of tea, coffee, alcohol, and drugs.

Augustus Desiré Waller (1856–1922), the son of eminent British neurophysiologist Augustus Volney Waller (1816–1870), was a British physiologist born in Paris, France. In 1884, he became a lecturer in physiology at St Mary's Hospital in London. In 1887, he used a capillary electrometer to record the first human electrocardiogram and created the first practical ECG machine with surface electrodes. He was appointed Fullerian Professor of Physiology at the Royal Institution in London in 1897. In 1917, a few years before his death, Waller published a study of more than 2,000 traces of heart conditions.

American surgeon William Stewart Halsted (1852–1922) emphasized strict aseptic technique during surgical procedures and was an early champion of newly discovered anesthetics. He was one of the "big four" founding professors at the Johns Hopkins Hospital in 1892.

American surgeon William Stewart Halsted (1852–1922) received his doctorate from the College of Physicians and Surgeons in New York in 1877. Afterward, he had further surgical and medical training at New York Hospital, Belleview, and two years of study in Austria and Germany. He began at Johns Hopkins in 1890 and became one of the "big four" founding professors at the Johns Hopkins Hospital. Halsted emphasized strict aseptic technique during surgical procedures and was an early champion of newly discovered anesthetics.

Heinrich Obersteiner (1847–1922) was an Austrian neurologist born in Vienna. In 1870, he earned his doctorate from the University of Vienna, where he worked in the laboratory of Ernst Wilhelm von Brücke (1819–1892). In 1873, he earned his habilitation for pathology and anatomy of the nervous system at the University of Vienna, becoming an associate professor there in 1880 and a full professor in 1898. He was also the director of a private

mental institution at Oberdöbling, outside of Vienna. In 1882, he established an internationally known neurological institute in Vienna. The eponymous Obersteiner–Redlich line is named after him and Emil Redlich (1866–1930). This zone is where the central nervous system and peripheral nervous system meet, as well as the place where Schwann cells meet oligodendroglia cells.

Louis-Antoine Ranvier (1835–1922) was a French physician, pathologist, anatomist, and histologist. In 1878, he discovered the regularly spaced discontinuities of the myelin sheath occurring at varying intervals along the length of a nerve fiber, which were eventually called the nodes of Ranvier. Other anatomical structures bearing his name are the Merkel-Ranvier cells, melanocyte-like cells in the basal layer of the epidermis that contain catecholamine granules; and Ranvier's tactile disks, a special type of sensory nerve ending. In 1897, he founded the scientific journal *Archives d'anatomie microscopique* with Edouard-Gérard Balbiani.

Joseph Erlanger (1874–1965) and Herbert S. Gasser (1888–1963) of Washington University in St. Louis, Missouri, studied action currents in peripheral nerves. They managed to amplify the action potential of a bullfrog sciatic nerve. Their findings appeared in 1922 in an article titled, "A Study of the Action Currents of Nerve with the Cathode Ray Oscillograph" in the *American Journal of Physiology*. In 1944, they won the Nobel Prize in Medicine or Physiology for this and several related discoveries.

Stanley Cohen (1922–2020), an American biochemist, was born in 1922. In 1953, he joined the zoology department at Washington University in St. Louis to work with Viktor Hamburger (1900–2001) and Rita Levi-Montalcini (1909–2012). He participated in the discovery of nerve growth factor (NGF) and epidermal growth factor (EGF). Cohen shared the 1986 Nobel Prize in Physiology or Medicine with Rita Levi-Montalcini for this work.

1872

Solomon Carter Fuller (1872–1953) was a pioneering Liberian and African-American physician, psychiatrist, and pathologist. Born in Monrovia, Liberia, he completed his college education and a medical degree in the United States. Shortly after the opening of Alois Alzheimer's laboratory at the Royal Psychiatric Hospital at the University of Munich in 1903, Fuller was among five selected foreign visiting students. He worked for much of his career at Westborough (Massachusetts) State Hospital. In 1919, Fuller became part of the faculty at Boston University School of Medicine, where he taught pathology. He made significant contributions to the study of Alzheimer's disease during his career.

Félix Voisin (1794–1872) was a French psychiatrist born in Le Mans. He was a disciple of Jean-Étienne Dominique Esquirol (1772–1840) and a colleague of Jean-Pierre Falret (-1794–1870), with whom he founded a private mental institution at Vanves in 1822. He moved to the Bicêtre Hospital in 1840, where he worked with the mentally impaired until his retirement in 1865. He was particularly interested in applying phrenology to the understanding of the pathology of mental retardation and insanity.

George Huntington (1850–1916) was an American physician who contributed a classic clinical description of the disease that bears his name: Huntington's disease. He first read the paper before the Meigs and Mason Academy of Medicine in Middleport, Ohio, on February 15, 1872, and then published it in the *Medical and Surgical Reporter of Philadelphia* on April 13, 1872.

1822

Conrad Eckhard (1822–1905) was a German physiologist born in Homberg. He studied medicine in Berlin and Marburg. From 1855 to 1891, he was an associate professor of physiology and anatomy at the University of Giessen; from 1858 to 1888, he was editor of *Beiträge zur Anatomie and Physiologie*. Eckhard is remembered for his pioneering research of motor (myotomes) and sensory (dermatomes) projections of nerve roots.

Adolph Kußmaul (1822–1902) was a German physician and a leading clinician of his time. He wrote his dissertation under Virchow in Würzburg. He was subsequently professor of medicine at Heidelberg (1857), Erlangen (1859), Freiburg (1859), and Straßburg (1876). During his first year at Heidelberg, he constructed the first ophthalmoscope. He is credited with being the first to describe progressive bulbar palsy and polyarteritis nodosa. He also described the paradoxical rise in jugular venous distension during inspiration seen in constrictive pericarditis (Kussmaul's sign), and the deep, labored breathing of severe diabetic ketoacidosis (Kussmaul respiration) seen in diabetic coma (Kussmaul coma). He was also the first to describe dyslexia, calling it "word blindness." His book on aphasia, *Die Störungen der Sprache. Versuch einer Pathologie der Sprache* Leipzig (1877), was a landmark in its time, and is perhaps his most important contribution.

Alfonso Giacomo Gaspare Corti (1822–1876) studied at Joseph Hirtl's (1810–1894) anatomical institute in Vienna, and moved in 1850 to Würzburg, where he worked with Albert von Kölliker (1817–1905) on the mammalian auditory system. He spent a short time in Utrecht, the Netherlands, with Jacobus Schroeder van der Kolk (1797–1862) and learned methods of perserving specimens of the cochlea. Returning to Würzburg, he completed his study of at least 200 cochleas of man and different animals and published his findings as "Recherches sur l'organe de l'ouïe des mammiferes," which appeared in 1851 in Kölliker's journal, *Zeitschrift für wissenschaftliche Zoologie*.

In 1822, French physiologist François Magendie (1783–1855) published his well-known study, *Experiences sur les fonctions des racines des nerfs rachidiens*, verifying the differentiation between sensory and motor nerves in the spinal cord, now referred to as the Bell-Magendie law. He was a member of the faculty of the College of France, holding the Chair of Medicine from 1830 to 1855.

German physiologist Karl Friedrich Burdach (1776–1847, see Figure 1) was a professor of physiology at the University of Dorpat in 1811 and at the University of Königsberg in 1815. In 1822, he introduced the terms *arcuate fasciculus* and *amygdala* in one of the three volumes of his *Vom Baue und Leben des Gehirns* (1819–1826). The column of Burdach or fasciculus cuneatus, the lateral portion of the dorsal funiculus of the spinal cord, is named after him. He differentiated the caudate nucleus from the putamen and identified the globus pallidus and its inner and outer segments.

In 1822, French physician Antoine Laurent Jessé Bayle (1799–1858) was the first to provide a comprehensive description of general paresis in his book, *Recherches sur l'arachnitis chronique, la gastrite et la gastro-entérite chroniques, et la goutte, considerées comme causes de l'aliénation mentale*. The disorder is sometimes referred to as paralytic dementia, general paralysis of the insane, or *maladie de Bayle* in medical literature.

John Henry Wishart (1781–1834) was a Scottish surgeon who worked at the Royal Infirmary of Edinburgh. Although a general surgeon, he published widely on ophthalmic

Figure 1. Karl Friedrich Burdach, lithography made in 1832 by Austrian painter Josef Kriehuber (1800–1876).

topics. In 1822, he published "A Case of Tumors in the Skull, Dura Mater, and Brain," which is regarded as the first publication in English describing the clinical features and macroscopic postmortem appearances of Type 2 neurofibromatosis.

1772

French naturalist Étienne Geoffroy Saint-Hilaire (1772–1844) established the principle of "unity of composition." He believed in the underlying unity of organismic design, and the possibility of the transmutation of species in time, amassing evidence for his claims through research in comparative anatomy, paleontology, and embryology. He was a colleague of Jean-Baptiste Lamarck and expanded and defended Lamarck's evolutionary theories. In 1822, using comparative observations, Saint-Hilaire was the first to propose that the ventral nervous system of arthropods corresponds to the dorsal nervous system of vertebrates.

French psychiatrist Jean-Étienne Dominique Esquirol (1772–1840) was Philippe Pinel's (1745–1826) favorite student at the Salpêtrière, where he got a permanent position in 1811. He initiated a course in *maladies mentales*, perhaps the first formal teaching of psychiatry in

France. In 1817, he coined the word *hallucination*. At the behest of the minister of internal affairs, Esquirol evaluated all of the institutions throughout France in which mental patients were confined. In 1838, he became the main architect of a national law that instituted departmental asylums for all mental patients.

1722 and before

Emanuel Swedenborg (1688–1772, see Figure 2)—the notable Swedish theologian, scientist, philosopher, and mystic—died in 1772. Unfortunately, many of his innovative works on the nervous system and localization of function, including *The Brain* and *The Cerebrum*, were not released to the public until the 1880s. Although his work antedated that of Franz Joseph Gall (1758–1828), it was not recognized until much later.

Swedenborg described the intricacies of the cerebral cortex, but he also discovered the perivascular spaces, the foramen of Magendie, and the cerebrospinal fluid. He noted the importance of the pituitary gland, or "arch gland," in maintaining normal neurological function. Finally, in a period when the cortex was given no significant function, Swedenborg developed the idea of somatotopic organization, and this was almost 100 years before Fritsch and Hitzig. Possibly also contributing to his obscurity, after these neuroscientific studies, he turned to theology and mysticism.

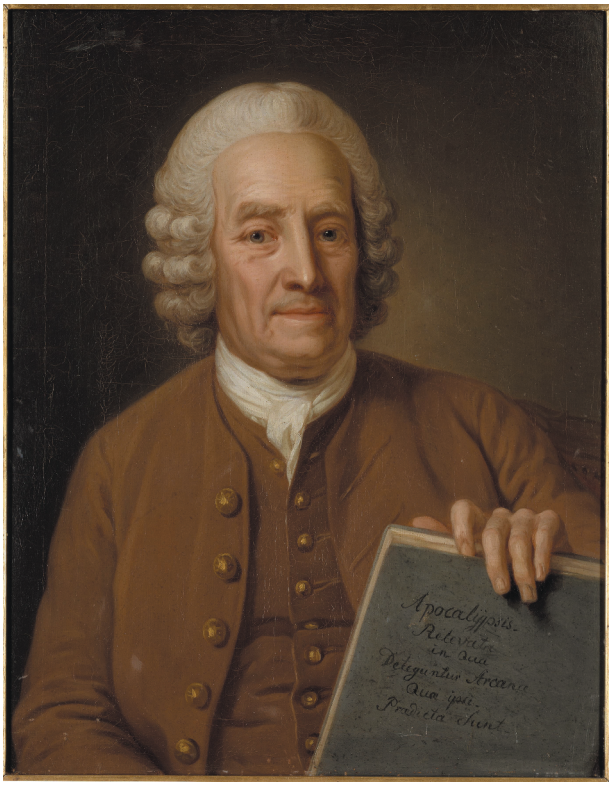

Figure 2. Emanuel Swedenborg, portrait by Swedish portraitist Per Krafft the Elder (1724–1793).

Petrus Camper (1722–1789) was a Dutch physician, anatomist, physiologist, midwife, zoologist, anthropologist, paleontologist, and naturalist in the Age of Enlightenment. He was one of the first to take an interest in comparative anatomy and paleontology, and he wrote on the significance of the facial angle as a marker for brain development and intelligence. He also was among the first to identify "anthropology" as part of natural history.

Franciscus de le Boë Sylvius (1614–1672) was a Dutch physician and an early champion of Descartes's, Van Helmont's, and William Harvey's work and theories. He founded the Iatrochemical School of Medicine, according to which all life and disease processes are based on chemical actions. He researched the structure of the brain. In 1663, in his *Disputationem Medicarum*, he described the lateral fissure. The Sylvian aqueduct is also named after him, as is the mineral sylvite. His book, *Opera Medica*, published posthumously in 1679, recognized scrofula and phthisis as forms of tuberculosis. His most famous students were Jan Swammerdam (1637–1680), Reinier de Graaf (1641–1673), and Niels Stensen (1638–1686).

De Anima Brutorum, one of the influential works of Thomas Willis (1621–1675), appeared in 1672. It offers a systematic account of diseases of the nervous system as they were known in his day. His account was largely derived from personal observations and not from traditional authorities, and was based on his concept of the animal spirits. This concept allowed him to develop a pathology of the animal spirits that embraced the whole content of the clinical neurology and psychiatry of his times. In this book, Willis described for the first time myasthenia gravis.

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